

Further Remarks on Two Rare Cowrie Species (Gastropoda)

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Zoila venusta (Sowerby, 1846) and its ally *Z. episema* Iredale, 1939 (Cypraeidae) recently have been treated by C. N. Gate (1962) in a paper excellent both with regard to the complete review of the history of these cowries, as well as to the descriptions of their morphological characters.

In the decade before World War II, I have personally examined the only three specimens of *Zoila venusta* preserved in collections of Europe; they are tabulated in Table 1.

Sowerby (1846) stated that the holotype of *Cypraea venusta* had been "received" from Port Adelaide, but he did not assert that it had been really collected there: therefore, its real habitat should be regarded as unknown, as the species surely does not live in eastern South Australia. Cox (1869) indicated that *C. thatcheri* had been collected in the Dampier Archipelago, but subsequently Brazier (1882) corrected the type locality to Cervantes Island (his quotation

of the width of the shell is evidently a misprint); Gate (1962, p. 9) thought the latter habitat should be adopted, whereas I prefer the former locality, as Cervantes Island is too close to the area inhabited by *Zoila episema*, and one might wonder that not more than four specimens of *Z. venusta* (the young "var." *bakeri* Gatliff, 1916, included) have been collected in this far better known area.

Cox (1869) possessed two specimens of *Cypraea thatcheri* said to be "exactly alike in every way"; he did not designate a holotype, but I think the shell figured in his original publication should be regarded as holotype. This shell which Cox had sent "to be figured" evidently remained in his collection until it was sold in 1904 by Sowerby and Fulton to Dautzenberg who expressly stated his shell to be the specimen figured by Cox; the minor differences between Dautzenberg's shell (Gate, 1962, Pl. 4) and Cox' figure mentioned by Schilder & Schilder (1952, p. 176) may be explained by inexact freehand

Table 1

Nomenclatural Status	Collection	Formula ¹ ; dorsal spots	Figure
<i>Cypraea venusta</i> SOWERBY, 1846 holotype	Saul, now Museum University Cambridge, England	71(62)28:16 oi	never figured
<i>Cypraea thatcheri</i> COX, 1869 holotype	Dautzenberg (received from Cox), now Museum Brussels	74(63)25:15 lh	Cox 1869, copied by Roberts 1885; new photograph in Gate 1962, pl. 4
<i>Cypraea thatcheri</i> COX, 1869 paratype	British Museum (received from Cox)	76(61)26:17 mi	Sowerby 1870, copied by Weinkauff 1881 and approxi- mately by Allan 1956

¹ The formula indicates the length of the shell (in millimeters), the relative breadth (in per cent of length, in parentheses), the absolute number of labial and columellar teeth (separated by a colon), and the relative closeness of labial and columellar teeth (as explained in SCHILDER, 1958)

drawing of the latter, especially for the purpose of making the shell appear more regular with regard to the distribution of dorsal spots, the number of which was increased. This view is supported by the fact that according to Sowerby (1870, p. 19) Cox sent the other specimen to the British Museum, and that he did so very soon, as this paratype was figured only one year after the original publication (pl. 2 of Sowerby's *The-saurus*, published in 1870). The formula calculated from Cox' original description [76(65)24: 14 lg] does not agree with either specimen, but this fact may be explained by inexact measuring and different counting of the teeth.

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Cate (1962, p. 13) has carefully described the differences between a recently discovered shell from West Wallaby Island in the Houtman Abrolhos Archipelago, thought to be *Cypraea venusta*, and the far more frequent *C. episema* living farther south. But these characters do not agree with the three adult *Zoila venusta* tabulated above, whereas these three real *Z. venusta* agree with *Z. episema* in all characters except that the columellar teeth are less obliterated in most specimens of the latter, the general color is much paler with the margins pinkish instead of greyish, and the spots reduced. Such superficial characters (as tabulated below) surely should be regarded as racial only; therefore, I have separated *Z. episema* as good species from *Z. thersites* (Gaskoin, 1849) in 1960, and I have united it with *Z. venusta* in my list of cowrie species in 1961.

[According to Iredale (1935), Gaskoin's paper printed in the volume for 1848 of the Proc. Zool. Soc. London in fact was published in March 1849, so that the correct data of *Cypraea thersites*, *C. bicolor*, *C. gracilis*, *C. labrolineata*, and *C. pallidula* are 1849, instead of 1848, as well as those of *C. obscura*, *C. sulcata*, *C. vitrea*, and *C. grando* now belonging to the family Triviidae.]

Among *Zoila venusta episema* with large dorsal spots and greyish, distinctly spotted margins, there are two different kinds of specimens: the typical large *Z. episema* from Cape Naturaliste (type locality) and Geographe Bay, and a consistently smaller variety with still darker and confused dorsal markings which evidently lives farther north and has been separated as "Sorrento Reef variant" by Cate (1962, p. 12). There is a distinct gap between the range of size in eleven specimens of this northern variant (53 to 65 mm) and seven southern

real *Z. episema* (75 to 81 mm), so that I should like to recommend the replacing of Cate's term "Sorrento Reef variant" by a Latin racial name.

Zoila venusta sorrentensis SCHILDER, subsp. nov.

Holotype: Formula 59(62)24:17 mk, dorsum nebulous pale chestnut with dark chestnut blotches, margins greyish pink with small brown spots, extremities pinkish grey, base whitish, teeth yellowish.

Type Locality: Collected at Sorrento Beach near Fremantle, 7 January 1962, by B. R. Wilson and presented by Ray Summers to coll. Schilder (No. 13344).

Paratypes: The hypotypes 3, 4, and 8 to 13 of *Cypraea episema* quoted by Cate (1962, p. 7) have been partially mentioned (but not figured) by Schilder (1960, p. 186).

Therefore, *Zoila venusta* should be divided into three geographical subspecies, which can be listed as follows (Table 2).

The differences of the geographically restricted races concern size and color only, but there is no constant difference in shape and in the structural features of the dorsum, extremities, margins, base, aperture, dentition, and fossula; the posterior columellar teeth possibly are more developed in *Zoila venusta venusta* than in the other two races.

Morphologically, *Zoila venusta sorrentensis* is an extreme race, connected with the other extreme, *Z. v. venusta*, by the intermediate *Z. v. episema*. Phylogenetically, *Z. v. sorrentensis* seems to represent the most primitive race, which has developed two progressive descendants with some parallelism in characters, spreading from its central habitat both to south (*Z. v. episema*) and north (*Z. v. venusta*) and thus constituting the "wedge" between the two larger and paler races. But nomenclatorially, *Z. sorrentensis* and *Z. episema* must be treated as subspecies of *Z. venusta* according to the rule of priority.

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The specimen from West Wallaby Island called *Cypraea venusta* by Cate (1962, p. 7), however, is quite different from the specimens discussed above. Cate has described the differences between *Zoila episema* and his "*venusta*" in an admirably exhaustive way, but they really refer to *Z. venusta* (including *episema*

Table 2

Name:	<i>Zoila venusta sorrentensis</i> SCHILDER, subsp. nov.	<i>Zoila venusta episema</i> IREDALE, 1939	<i>Zoila venusta venusta</i> SOWERBY, 1846
synonyms:	<i>episema</i> SUMMERS, 1961 "Sorrento Reef variant" CATE, 1962	<i>venusta</i> var. COX, 1889 <i>brunnea</i> (emend.) HIDALGO, 1906 (preoccupied) <i>venusta</i> SUMMERS, 1961	<i>thatcheri</i> COX, 1869 <i>bakeri</i> GATLIFF, 1916 —
hypotypes of <i>episema</i> in CATE, 1962, p. 7	No. 3, 4, 8, 9, 10, 11, 12, 13	No. 1, 2, 5, 6, 7	
photographs in CATE, 1962	plate 3, figs. 2, 3	pl. 2, figs. 2, 3; pl. 3, fig. 1	plate 4, figs. 1, 2, 3
other photographs	—	IREDALE, 1939, plate 27, figs. 3, 4 SCHILDER, 1960, plate 14, fig. 1	—
inhabited part of Western Australia	central (Fremantle: Sorrento Reef)	southern (Geographe Bay, Cape Naturaliste)	northern (probably Dampier Archipelago)
specimens (or their illustrations) examined	11	7	4
length in mm, mean and (range)	59 (53-65)	78 (75-81)	73 (71-76)
breadth in %, mean and (range)	64 (62-67)	65 (61-69)	64 (61-70)
labial : columellar teeth mean	22 : 15	24 : 17	26 : 16
closeness of teeth, mean and (range)	1 : i (i - n) : (g - k)	1 : i (k - n) : (h - k)	m : i (l - o) : (h - i)
dorsal ground color	hidden	whitish	pinkish
dorsal blotches	confusedly confluent	partially confluent	discrete
margins (at extremities)	greyish	greyish	pink
margins	spotted	spotted	unspotted
teeth	brownish	paler brownish	whitish

and *sorrentensis*) and a new species, which I propose to call:

Bernaya catei SCHILDER, spec. nov.

Holotype: The unique shell [formula: 76(65)23: 17 (not 16) ki] figured by Cate (1962) on Plate 1 (in color) and on Plate 2, the two lowermost photographs (to be called figure 1).

The chief specific differences may be tabulated once more as follows (Table 3).

Several superficial characters, as the dorsal line and the transverse striae of the outer lip, seem to approach *Bernaya catei* to *Zoila thersites* (Gaskoin, 1849) from South Australia.

Most essential characters, however, especially the symmetrical profile line in lateral view, the less angular margins, the straight aperture, the more primitive outlets, the well developed columellar teeth sloping inward, etc., seem to point rather to the genus *Bernaya* than to *Zoila* (Schilder, 1941, pp. 80-81). This genus seems to have become extinct in Eocene times, as the two most primitive cowrie species, *B. teulerei* (Cazenavette, 1846) and *B. fultoni* (Sowerby, 1903), are more pyriform than globular and therefore they belong to the subgenus *Protocypraea*. The photograph of *B. catei* published by Cate (1962) on Plate 2 (lowermost figures) surprisingly agrees with *B. media* (Deshayes, 1835) from the Eocene of France, and it also recalls

Table 3

Name of species:	<i>Bernaya catei</i> SCHILDER, spec. nov.	<i>Zoila v. venusta</i> (SOWERBY, 1846)
general shape	globular	subpyriform
maximum height	central	posteriorly
anterior extremity	steep (as the rear)	sloping
marginal edges	rather rounded	more angular
base	rather convex	flattened
base in front	less impressed	concave
base along aperture	sunken, rounded	rather angular
aperture in front	less dilated	much dilated
aperture behind	rather straight	much curved
anterior outlet	rather vertical	oblique
same seen from base	less emarginate	deeply emarginate
columellar teeth	extended inward though the fossula itself is smooth	restricted to the margin of the aperture
anterior columellar teeth	rather small, short, transversal	larger, elongate, oblique
posterior columellar teeth	rather developed	mostly obsolete
paler dorsal line	well developed	absent
lateral spots	few, on the right side only	well developed on both margins (in dark races only)
lateral striae	vertical	transversally marmorate in all races
brownish color on the outer lip	transverse striae produced across the lip	mostly restricted to the teeth themselves

B. cavata (Edwards, 1865) from the Eocene of England, of both of which I possess well preserved shells; but *B. catei* is much larger, approaching in size to *B. baluchistanensis* (Noetling, 1897) from the Upper Cretaceous of Pakistan and Libya, and to *B. brevis* (Douvill , 1920) from the Eocene of Nigeria, of both of which only internal casts are known (one cast of each also in the writer's collection). Therefore, *B. catei* should be classified as *Bernaya* (s. str.), though some characters tend towards *Zoila*.

Among extinct species, some more cowries connecting *Bernaya* (distributed along the Paleogene equator of the Eastern hemisphere) and *Zoila* (evidently restricted to the eastern border of this area): besides the poor remains of *B. zoiloides* Schilder (1958) from the Eocene of New Zealand, there are the well preserved shells of *Z. schilderi* Dey (1941) and *Z. gendinganensis* (Martin, 1899) from Upper Miocene and Pliocene beds of India and Java, respectively, which show still many characters of *Bernaya*. *Zoila platypyga* (McCoy, 1876) and its allies from the Miocene of Victoria, however, are real *Zoila* (with strong teeth recalling *Lyncina sulcidentata* (Gray), and *Z. kendgensis* Schilder

(1941) from the Pleistocene of Java seems to be a tropical antecedent of *Z. friendii* (Gray).

The recently discovered living *Bernaya catei* seems to represent another link connecting *Bernaya* with *Zoila*, so that one should consider degrading *Zoila* to a subgenus of *Bernaya*. At any rate *B. catei* represents the most ancestral living cowrie species, which I am glad to connect with the name of our very zealous promoter of cypraeology.

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Additional references are quoted on page 14 in Cate, 1962.